FABRIC PAD BEARING
June 3, 1996

Description
This work includes all materials for the construction and installation of the fabric pad bearings as shown in the Plans and as specified.

The fabric pad bearing consists of an upper unit and a lower unit. The upper unit includes a sole plate and a stainless steel sheet. The lower unit includes a polytetrafluorethylene (TFE) sheet, a steel backing plate, a preformed fabric pad, and a masonry plate, except as shown in the Plans for the transverse restrainer bearings. The upper and lower units shall be supplied by a single bearing manufacturer.

Materials
The preformed fabric pads shall be composed of multiple layers of duck impregnated and bound with high quality oil resistant synthetic rubber compressed into resilient pads of uniform thickness. The duck shall be of highest quality cotton or cotton-polyester 50-50 blend, and shall weigh a minimum of 227 grams per square meter. The cotton warp and the filling yarn shall be 2-ply. The cotton-polyester warp and fill shall be single yarn, with a minimum breaking strength by grab method of 1.03 megapascals warp, and 0.97 megapascals fill. The filling count of the duck shall be 40 $\pm$ 2 threads per 25.4 millimeters and the warp count shall be 50 $\pm$ 1 thread per 25.4 millimeters. The duck shall be certified to conform to the above. The number of plies shall be such as to produce the specified thickness, after compression and vulcanizing. The finished pads shall withstand compression loads perpendicular to the plane of the laminations of not less than 68.95 megapascals without any sign of failure after the load is removed. Failure is defined as any breakdown of the component materials or laminations. The preformed fabric pad shall have a shore A hardness of 90$\pm$5.

The TFE self-lubricating bearing sheet shall be 3.18 millimeters thick unless otherwise noted in the Plans. The TFE sheet shall be composed of 100 percent virgin (unfilled) polytetrafluorethylene polymer except where filled TFE is called for in the Plans. The TFE sheet shall be recessed and bonded to a depth of one half the TFE sheet thickness into the steel backing plate. The exposed height of the TFE shall be not less than 1.19 millimeters. The substrate shall limit the flow (elongation) of the confined TFE to not more than 0.2286 millimeters under a load of 13.79 megapascals for 15 minutes at 25 degrees C for a 50.8 by 76.2 millimeter test sample. Dimpled TFE, if shown in the Plans, shall be unfilled and have a minimum thickness of 4.76 millimeters. Dimples shall be placed in a 12.7 millimeter grid and shall have a depth of 1.59 millimeters. The properties of the (unfilled) TFE shall be certified to conform to the following requirements:

Requirement	Test Method	Value
Hardness at 25^{-}C	ASTM D 2240	50-65 Durometer D
Tensile Strength	ASTM D 1457	19.31 MPa (Min. Avg.)
Elongation %	ASTM D 1457	1.38 MPa (Min. Avg.)
Specific Gravity	ASTM D 792	2.14 to 2.21

The filled TFE sheet shall be made from virgin TFE resin uniformly blended with inert filler material (15% glass fiber). The properties of (filled) TFE shall be certified to conform to the following requirements:

Requirement	Test Method	Value
Tensile Strength	ASTM D 1457	15.2 MPa (Min. Avg.)
Elongation %	ASTM D 1457	150% (Min. Avg.)
Specific Gravity	ASTM D 792	2.2
Melting Point	ASTM D 1457	327C±10C

The stainless steel sheet shall be no less than 1.9 millimeters meeting ASTM A 240 Type 304 specifications. Stainless steel in contact with the TFE shall have a finish of 0.254 micrometers R.M.S. (Root-Mean-Square) or less. The stainless steel sheet shall be seal welded all around to the sole plates by the gas tungsten-arc welding process (GTAW) in accordance with applicable AWS recommended practices. The seal weld shall not protrude beyond the surface of the stainless steel. The stainless steel sheet shall be clamped down to have full contact with the sole plate during welding. The surface of the sole plate in contact with the stainless steel sheet shall have a surface roughness of 3.175 micrometers R.M.S.

The sole plate, steel backing plate, bars and masonry plate shall conform to AASHTO M 183 and the dimensions shall comply with the details as shown in the Plans. The surface of the recess of the steel backing plate shall have a surface roughness of 6.35 micrometers R.M.S. All exposed steel plate surfaces, except stainless steel surfaces, shall be painted in accordance with the Special Provision **APPLICATION OF PAINT**. The stainless steel sheet to sole plate seal weld shall be painted in accordance with the Special Provision **APPLICATION OF PAINT**. ASTM A 449 bolts, nuts, and washers shall be hot-dip galvanized in accordance with AASHTO M 232.

Submittals

A. Shop Plans

1. Before fabrication of any bearing, the Contractor shall submit shop plans to the Engineer for approval in accordance with Section 6-03.3(7). These drawings shall include but not be limited to the following information:

    a. Plan and elevation of the bearing showing dimensions and tolerances.

    b. Complete details of all components and sections showing all materials incorporated into the bearing.

    c. All AASHTO, ASTM or other material designations.

    d. Bearing manufacturer's recommendations and procedures for bearing assembly shipment and storage.

B. Basis of Acceptance

Prior to the installation of the fabric pad bearings in part or in whole, the Contractor shall submit to the Engineer the following test reports, certifications, and samples for review, testing and approval.

1. Manufacturer's certificate of compliance for the polytetrafluorethylene (TFE) sheeting, fabric, and elastomer.

2. Certified mill test reports for all steel and stainless steel in the bearing assemblies.

3. Certified test reports confirming that the preformed fabric pads meet the specified requirements of proof load.

4. Samples of the preformed fabric pads, size 152.4 millimeters by 152.4 millimeters by 25.4 millimeters, from the production material.

The time to test and review the submitted items will be a minimum of 15 calendar days from the time these items are received at the Engineer's office until the necessary information is returned to the Contractor at the project site. The actual time required for review is dependent upon the completeness and accuracy of the material as submitted. Any deficiencies will require additional time for review. If submittals are returned to the Contractor to correct deficiencies, an additional 15 calendar days may be required for the review process.

Field inspection of a representative number of bearings assemblies will be performed by the Engineer. A clean dry and enclosed area shall be provided by the Contractor. The Engineer will identify the bearing assemblies to be inspected and the Contractor shall do all the necessary work to allow the Engineer to inspect the bearing assemblies.

Construction Requirements

Flatness of bearing surfaces shall be determined by the following method:

A. A precision straightedge, longer than the nominal dimension to be measured shall be placed in contact with the surface to be measured as parallel to it as possible.

B. Select a feeler gauge having an accuracy of $\pm$ 0.0254 millimeters equal to the tolerance allowed and attempt to insert it under the straightedge.

C. Surfaces are acceptable if the feeler gauge does not pass under the straightedge.

D. In determining the flatness, the straightedge may be located in any position on the surface being measured.

Flatness tolerances shall be defined as follows:

A. Class A tolerance = 0.0005 x nominal dimension

B. Class B tolerance = 0.001 x nominal dimension

C. Class C tolerance = 0.01 x nominal dimension

(Nominal dimension shall be taken as the actual dimension of the plate or sheet under the straightedge, in millimeters.)

Manufacturing tolerances for the bearings are as follows:

A. TFE Sheet

Plan dimensions:	Total nominal design area -0, + 3 mm
Thickness:	-0, +0.397 mm
Flatness:	Class B tolerance, both surfaces

B. Stainless Steel Sheet

Plan dimensions:	-0, +4.76 mm
Flatness:	Class B tolerance, both surfaces

C. Sole Plate

Plan dimensions:	-0, +4.76 mm
Thickness:	-1.59 mm, +4.76 mm
Flatness:	Class B tolerance, side in contact with the Stainless Steel Class C tolerance, side in contact with epoxy gel, grout, or concrete

D. Steel Backing Plate

Plan dimensions:	-0, +4.76 mm
Thickness:	-0, +4.76 mm
Width and length of recess:	-0, +1.59 mm, of TFE sheet size
Flatness:	Class B tolerance, both surfaces

E. Fabric Pad

Plan dimension:	-0, +4.76 mm
Thickness:	-1.59 mm, +4.76 mm
Surface finish:	For preformed fabric pads fabricated from multiple layers, the vertical face shall be free of visible horizontal displacement between the individual layers.

F. Masonry Plate & Bars

Plan dimension:	-0, +4.76 mm
Thickness:	-0, +4.76 mm
Flatness:	Class B Tolerance, side in contact with masonry plate or bars Class C Tolerance, free side or side in contact with grout

G. Overall Height

Total thickness:	-0, +10 percent

The Contractor shall protect the bearing assemblies from all damage, and exposure to the elements, during shipment and storage prior to installation in accordance with the manufacturer's recommendations and procedures listed in the shop plans as approved by the Engineer.

The sliding surfaces shall be finished true, lubricated and installed level or installed as shown in the Plans for transverse restrainer bearings.

A uniform thin film of silicone grease shall be applied to the entire TFE sheet before installation.

For cast-in-place concrete superstructures the sole plates shall be anchored to the structure as shown in the Plans.

For precast concrete superstructures and steel superstructures the sole plates shall be set with epoxy gel just before setting the superstructure in place. The sole plate top surface in contact with the epoxy gel shall receive a thin uniform film of silicone grease, to prevent bonding to the epoxy gel. The anchor bolts and insert threads shall be greased to prevent bonding and allow future removal. Apply epoxy gel by troweling it into the concrete recess or onto the bottom of the steel superstructure and immediately bolting the sole plate in place to obtain a level surface. Before the epoxy gel has cured, the superstructure shall be set in place, squeezing out excess epoxy gel while filling the entire recess. Excess epoxy and grease shall be removed immediately. Special care shall be exercised at all times to ensure protection of the stainless steel and TFE surfaces from coming in contact with concrete or any other foreign matter. After the epoxy gel has cured, the anchor bolts shall be tightened to snug tight.

The silicone grease shall conform to military specification MIL-S-8660.

The epoxy gel shall conform to the requirements of Section 9-26.1, Type 1, Grade 3, Class A, B, or C. The Contractor shall submit certification from the manufacturer that certifies the silicone grease and epoxy meets these specifications.

The lower contact surface of the TFE sheet shall be bonded to the steel backing plate with epoxy specified by the TFE manufacturer. The grout pad and masonry plate shall be installed level. The grout pad shall be pressure installed starting at the middle of the masonry plate.

All forms and debris that tend to interfere with the free action of the bearing assemblies shall be removed at the time falsework and forms are removed.

Payment

All costs in connection with furnishing, testing, and installing the bearings as shown in the Plans and as specified shall be included in the *** $$1$$ ***.